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Hazardous Waste Program
MO Dept. of Natural Resources

January 19, 2011

Ms. Christine Kump-Mitchell
Project Coordinator, Hazardous Waste Program
P.O. Box 176
Jefferson City, MO 65102-0176

Re: Modine Manufacturing Company – Camdenton, MO
Submittal of 2010 Indoor Air Sampling and Analysis Technical Memorandum
AOC No. 99-HW-002

Dear Ms. Kump-Mitchell:

Please find enclosed a copy of the above-referenced report summarizing the indoor air vapor intrusion sampling and analysis conducted at Modine's Camdenton Missouri facility. As indicated in the Conclusions and Recommendations section of the Memorandum, Modine intends to define future site closure activities pending the issuance of EPA's final IRIS RfC for TCE which is anticipated later this year.

Please feel free to call me with any questions at (262) 636-1412 or by email at t.e.meitner@na.modine.com.

Sincerely,

Thomas E. Meitner
EH&S Manager

enclosure

Cc: Mr. Bruce Stuart – MDNR
Mr. Richard Martin – RAASMartin, LLC
Modine – Camdenton
File

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RCRA

2010 Indoor Air Sampling and Analysis – Modine Manufacturing Facility, Camdenton, Missouri

PREPARED FOR: Missouri Department of Natural Resources
U.S. Environmental Protection Agency

PREPARED BY: Modine Manufacturing Company

DATE: December 10, 2010

This memorandum describes the sampling and analysis of indoor and outdoor air conducted at the former Modine Manufacturing Facility located at 221 (formerly 179) Sunset Drive in Camdenton, Missouri. Sampling and analysis was performed in accordance with the *Final Quality Assurance Project Plan (QAPP) for Indoor Air Sampling at the Modine Manufacturing Facility* (CH2M HILL 2010).

Sampling Activities

Indoor and outdoor air samples were collected on August 12, 2010 from the locations shown in Figure 2-1 of the *QAPP* (CH2M HILL 2010). Air sampling locations are the same as the locations where air samples were collected in 2003. The rationale for the sampling design is to evaluate the current VOC concentrations in indoor air compared to the concentrations detected at the same locations in 2003. The rationale for the locations selected in 2003 is described in Section 1.3 of the *QAPP* (CH2M HILL 2010). The existing data indicate these locations are appropriate to determine the potential risk to human receptors inside the building. The air investigation measured current concentrations inside the building for VOCs analyzed in 2003; trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), vinyl chloride (VC), 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), tetrachloroethene (PCE), and methylene chloride.

The outdoor air sample was collected simultaneously with indoor air samples to evaluate the potential influence, if any, of outdoor air on indoor air quality. The results from the outdoor air sampling and literature values are used to develop background values in air. The concentrations in outdoor air are used along with risk-based concentrations to evaluate indoor air sampling results.

Air samples were collected over an 8-hour period during daytime working hours using SUMMA canisters equipped with flow controllers. Indoor air samples from occupied spaces were collected from a height between 3 and 5 feet above the ground (roughly, breathing zone height). Samples were placed in appropriate shipping containers and shipped via courier under chain of custody to the laboratory for analysis.

The total number of samples collected, including QC samples, sampling locations, sample type, and the parameters analyzed are defined in Table 1.

Analytical Results

Table 2 presents the analytical results for the indoor and outdoor air samples collected and a comparison of the analytical results against screening criteria presented in the *QAPP* (CH2M HILL 2010) to determine if air concentrations are above risk-based screening levels. Two of the 8 analytes (PCE and TCE) were detected at concentrations exceeding industrial indoor air screening levels in at least one sample. Two analytes (PCE and TCE) were detected in outdoor air, and the concentrations were approximately one order of magnitude below those detected in indoor air samples.

PCE was detected in 2010 above its screening level at one sampling location, at an estimated (J-flagged) concentration of 4.01 ug/m³. PCE was detected at a concentration similar to that detected in 2003 (3.51 ug/m³). The screening level (2.08 ug/m³) is based on a target excess lifetime cancer risk (ELCR) of 1x10⁻⁶; the estimated ELCR associated with the detected PCE concentration is 2x10⁻⁶ (based on the linear relationship between concentration and risk). Since the MDNR target risk for an individual chemical is ≤1x10⁻⁵, the current air concentration results in an ELCR less than the MDNR target risk level.

TCE was detected in 2010 at a maximum concentration of 21.5 ug/m³. The maximum detected concentration is significantly lower than in 2003 (331 ug/m³). The screening level presented in the *QAPP* (CH2M HILL 2010) (1 ug/m³) is based on a non-cancer hazard quotient (HQ) of 0.1 (to account for cumulative effects from multiple constituents in indoor air) and use of the New York State Department of Health (NYSDOH) screening level for residential indoor air (a U.S. Environmental Protection Agency (EPA) Tier 3 toxicity value). TCE was detected above the screening level at the 6 indoor air sampling locations as well as in the duplicate.

However, it is overly conservative to base the need for remediation on exceedances of the NYSDOH-based screening level, particularly since the EPA's Science Advisory Board has reviewed EPA's draft RfC (22 ug/m³) and concluded that it is conservative. Therefore, detected concentrations were also compared against three additional screening levels:

- Based on NYSDOH & Non-Cancer HQ=1: The screening level (10 ug/m³) is based on a HQ of 1 and use of the NYSDOH screening level for residential indoor air (an EPA Tier 3 toxicity value); TCE concentrations at 4 of 6 indoor air sampling locations exceed this screening level.
- Based on Cal/EPA IUR: The screening level (6.1 ug/m³) is based on the Cal/EPA inhalation unit risk (IUR) (an EPA Tier 3 toxicity value); although TCE was detected above the screening level at the 6 indoor air sampling locations as well as in the duplicate, the maximum detected concentration is associated with an ELCR of 4x10⁻⁶ (based on the linear relationship between concentration and risk), which is less than MDNR's target risk level of 1x10⁻⁵.
- Based on Draft EPA RfC: The screening level (22 ug/m³) is based on EPA's draft Toxicological Review of TCE (June 2009) (which provides a draft RfC of 5 ug/m³) and a HQ of 1. EPA is expected to finalize this toxicological review (and generate Tier 1 toxicity values for the Integrated Risk Information System [IRIS] database) in mid-2011. EPA's Science Advisory Board recently reviewed EPA's draft Toxicological

Review and concluded that EPA's draft RfC was conservative and represented the lowest RfC across all toxic endpoints, and recommended calculating a final RfC considering multiple toxic endpoints. Although there remains some uncertainty in what the final EPA IRIS RfC will be, use of this screening level (based on the EPA draft RfC) is expected to be conservative since EPA may present a higher (less conservative) RfC in the final IRIS posting. All detected concentrations are less than this screening level.

Data Quality Evaluation

Review of laboratory control data and field QC procedures were used to assess the precision, accuracy, representativeness, comparability, and completeness (PARCC) of the sample data collected. The assessment concluded that the PARCC of the data are generally acceptable. Evaluation of the data was performed in accordance with the *QAPP* (CH2M HILL 2010) and individual method requirements.

Precision

Precision of the data was verified through review of the field and laboratory data quality indicators that include: duplicate matrix spikes, field duplicate sample results. Precision was found to be acceptable with the exceptions presented in Table 3.

Accuracy

Accuracy of the data was verified through review of laboratory control sample, matrix spike, and surrogate spike data. Accuracy was acceptable.

Representativeness

Representativeness of the data was verified through the samples collection, storage and preservation procedures, hold-time compliance and evaluation of laboratory blank data. All of the data are reported from analyses within the EPA recommended hold-time. Methylene chloride, 1,1,1-TCA, TCE and PCE were detected in either a laboratory blank, canister certification or flow control certification affecting a few results (Table 4). These data have been considered non-detected at the reported result during project decision-making. Overall, blank contamination was indicative of normal laboratory and field operations and does not impact the sample data as reported.

Comparability

Comparability of the data was ensured through the use of standard EPA analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that collection and analytical techniques followed approved, documented procedures.

Completeness

Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid, or usable, measurements compared to planned measurements. Valid data are defined

as all data that were not rejected during data evaluation. The completeness for the dataset is one hundred percent.

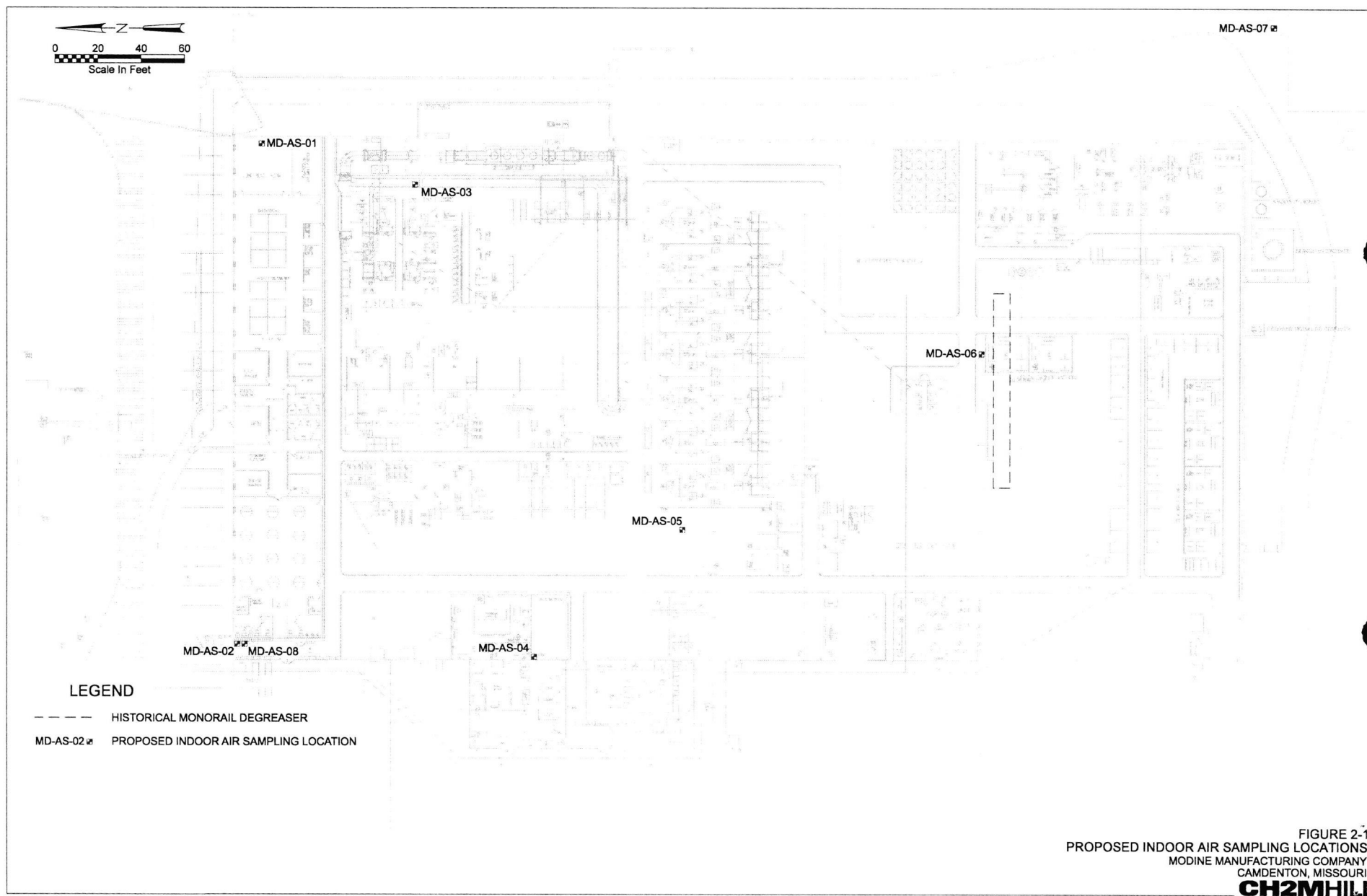
Conclusions and Recommendations

Indoor air concentrations have significantly decreased since 2003. There remains some uncertainty in what the final EPA IRIS RfC for TCE will be. Use of the screening level (based on the EPA draft RfC) is expected to be conservative since EPA may present a higher (less conservative) RfC in the final IRIS posting. All detected indoor air concentrations are less than the screening level that is based on the EPA draft RfC. Modine plans propose a path forward at the site related to indoor air following the release of the final EPA IRIS RfC for TCE.

References

CH2M HILL. 2010. *Final Quality Assurance Project Plan for Indoor Air Sampling at the Modine Manufacturing Facility*. Camdenton, Missouri.

Figures



Tables

TABLE 1

Sampling and Analysis Summary

Modine Manufacturing Facility, Camdenton, Missouri

Location ID	Sample ID	Location	Type	Analysis ^a
MD-AS-01	MD-AS01-081210	Office wing conference room	Indoor Air	VOCs
MD-AS-02	MD-AS02-081210	Office wing restroom sink area	Indoor Air	VOCs
MD-AS-03	MD-AS03-081210	NE plant corner	Indoor Air	VOCs
MD-AS-04	MD-AS04-081210	Training room near chemical storage area	Indoor Air	VOCs
MD-AS-05	MD-AS05-081210	Center of plant near welding bays	Indoor Air	VOCs
MD-AS-06	MD-AS06-081210	South end of plant in historical degreaser location	Indoor Air	VOCs
MD-AS-07	MD-AS07-081210	Outside facility on the southeast side of the building	Outdoor Air	VOCs
MD-AS-08	MD-AS08-081210	Duplicate of MD-AS-02	Indoor Air	VOCs
MD-AS-B1	MD-ASB1-081210	Blank	Storage/Trip Blank	VOCs

Notes:

Sample ID consist of the location ID and date.

^aIndoor air samples were analyzed for the following VOCs; TCE, cis-1,2-DCE, VC, 1,1-DCE, 1,1,1-TCA, 1,1-DCA, PCE, and methylene chloride

VOC gas samples were collected in laboratory-supplied Summa canisters and analyzed by GC/MS-TO15.

TABLE 2

Indoor Air Analytical Results

Modine Manufacturing Facility, Camdenton, Missouri

	Location ID	MD-AS-01	MD-AS-02		MD-AS-03	MD-AS-04	MD-AS-05	MD-AS-06	MD-AS-07	MD-AS-B1
	Sample ID	MD-AS01-081210	MD-AS02-081210	MD-AS08-081210	MD-AS03-081210	MD-AS04-081210	MD-AS05-081210	MD-AS06-081210	MD-AS07-081210	MD-ASB1-081210
	Sample Date	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010
Analyte	Screening Level									
TCE	1	6.88	7.81	8.52	21.5	20.9	16.4	13.6	0.737	0.218U
cis-1,2-DCE	26.3	0.266U	0.274U	0.3U	0.298U	0.311U	0.279U	0.295U	0.295U	0.161U
Vinyl Chloride	2.79	0.172U	0.177U	0.193U	0.192U	0.201U	0.18U	0.19U	0.19U	0.104U
1,1-DCE	87.6	0.0312J	0.0331J	0.3U	0.125J	0.113J	0.106J	0.127J	0.295U	0.161U
1,1,1-TCA	2190	0.154U	0.134J	0.148J	0.367J	0.382J	0.321J	0.296J	0.406U	0.222U
1,1-DCA	7.67	0.272U	0.28U	0.306U	0.305U	0.318U	0.285U	0.301U	0.301U	0.165U
PCE	2.08	0.377U	4.01J	0.112J	0.17J	0.533U	0.217J	0.387J	0.0397J	0.276U
Methylene chloride	26.1	5.83U	6.01U	1.35J	6.54U	6.82U	6.11U	6.47U	6.47U	3.5U

Notes:

Analytical results are reported in units of ug/m³

J - The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Bold indicates the analyte was detected

Shading indicates the analyte exceeded

TABLE 3

Relative Percent Difference Exceedences

Modine Manufacturing Facility, Camdenton, Missouri

Sample ID	Analyte	Units	Final Result	Validation Flag	Validation Reason
MD-AS-08-081210	PCE	ug/m ³	0.112	J	FD>RPD
MD-AS-02-081210	PCE	ug/m ³	4.01	J	FD>RPD

Notes:

FD>RPD - The relative percent difference exceeded the QAPP precision criteria.

TABLE 4

Analytes Detected in Flow Controller Certification, Method Blank, and Canister Certification Analysis
Modine Manufacturing Facility, Camdenton, Missouri

Sample ID	Analyte	Units	Final Result	Validation Flag	Validation Reason
MD-ASB1-081210	1,1,1-TCA	ug/m ³	0.222	U	FC<RL
MD-AS07-081210	1,1,1-TCA	ug/m ³	0.406	U	FC<RL
MD-AS01-081210	1,1,1-TCA	ug/m ³	0.154	U	FC<RL
MD-AS01-081210	PCE	ug/m ³	0.377	U	FC<RL
MD-AS01-081210	Methylene chloride	ug/m ³	5.83	U	FC<RL
MD-AS02-081210	Methylene chloride	ug/m ³	6.01	U	FC<RL
MD-AS02-081210	Methylene chloride	ug/m ³	6.01	U	FC<RL
MD-ASB1-081210	1,1,1-TCA	ug/m ³	0.222	U	LB<RL
MD-AS07-081210	1,1,1-TCA	ug/m ³	0.406	U	LB<RL
MD-ASB1-081210	TCE	ug/m ³	0.218	U	CAN<RL
MD-AS04-081210	PCE	ug/m ³	0.533	U	CAN<RL

Notes:

FC<RL - Analyte was detected in the associated flow controller certification analysis.

LB<RL - Analyte was detected in the associated laboratory method blank analysis.

CAN<RL - Analyte was detected in the associated canister certification analysis.